EFFECT OF CEO FINANCIAL EXPERTISE ON THE COST BEHAVIOR OF BRAZILIAN LISTED COMPANIES

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ABSTRACT

This research analyzed the effect of CEO financial expertise on the asymmetric cost behavior of Brazilian listed companies. The study sample consisted of 178 companies in the period 2012-2021. Multiple linear regression was used for the analysis using the Stata software. In the calculation of the asymmetric cost behavior, the model of Anderson et al. (2003) was used, and the Cost of Goods Sold (COGS), Selling, General and Administrative Expenses (SG&A) and Total Cost (TC) accounts were analyzed. CEO financial expertise was measured based on four characteristics according to the model of Bortoli and Soares (2021), being grouped into a single index through PCA: (i) academic background in finance; (ii) experience in the financial sector; (iii) experience as a financial director; and (iv) years of experience in the position of CEO. The results indicated that CEO financial expertise leads to anti-sticky asymmetric behavior for COGS and TC. This result also occurred in additional tests of individual analysis of the variables of CEO financial expertise. The study contributes mainly to professionals such as auditors and market analysts, in the sense that their work procedures can be increased, by the understanding that the level of CEO financial expertise is a factor that can impact the asymmetric behavior of companies' costs. The contribution to the literature consists of identifying how managers' characteristics, such as the level of financial knowledge, interfere in decisions related to cost management.

Keywords: Asymmetric cost behavior. CEO financial expertise. Brazilian listed companies.

EFEITO DA EXPERTISE FINANCEIRA DO CEO NO COMPORTAMENTO DOS CUSTOS DE COMPANHIAS ABERTAS BRASILEIRAS

RESUMO

Essa pesquisa analisou o efeito da *expertise* financeira do CEO no comportamento assimétrico dos custos de companhias abertas brasileiras. A amostra do estudo consistiu em 178 empresas no período 2012-2021. Para a

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análise, utilizou-se a regressão linear múltipla por meio do *software* Stata. No cálculo do comportamento assimétrico dos custos foi utilizado o modelo de Anderson et al. (2003), sendo analisadas as contas de Custo dos Produtos Vendidos (CPV), Despesas de Vendas, Gerais e Administrativas (DVGA) e Custo Total (CT). A *expertise* financeira do CEO foi mensurada com base em quatro características de acordo com o modelo de Bortoli e Soares (2021), sendo agrupadas em um único índice através de ACP: (i) formação acadêmica em finanças; (ii) experiência no setor financeiro; (iii) experiência como diretor financeiro; e (iv) anos de experiência no cargo de CEO. Os resultados indicaram que a *expertise* financeira do CEO ocasiona no comportamento assimétrico *anti-sticky* para o CPV e o CT. Esse resultado também ocorreu nos testes adicionais da análise individual das variáveis da *expertise* financeira do CEO. O estudo contribui principalmente para profissionais como auditores e analistas de mercado, no sentido de que seus procedimentos de trabalhos podem ser incrementados, pelo entendimento de que o nível de *expertise* financeira dos CEOs ser um fator que pode impactar no comportamento assimétrico dos custos das empresas. A contribuição para a literatura consiste na identificação de como características dos gestores, como o nível de conhecimento financeiro, interferem nas decisões relacionadas à gestão de custos.

Palavras-Chave: Comportamento assimétrico dos custos. Expertise financeira do CEO. Companhias abertas brasileiras.

1 INTRODUCTION

Understanding cost behavior is an essential element for cost accounting (Anderson et al., 2003; Banker et al., 2018). The traditional model of cost behavior describes a linear relationship between cost and activity change, so if there is a change in the volume of activity, costs will change in the same proportion (Anderson et al., 2003; Richartz & Borgert, 2021; Ballas et al., 2020; Ibrahim et al., 2022).

However, Anderson et al. (2003) presented evidence that the relationship between costs and volume of activities does not necessarily occur in a linear manner. The authors identified that costs increase more for increases in sales than they decrease in relation to a decrease of the same proportion in sales. This asymmetric behavior was called sticky costs by Anderson et al. (2003).

The literature on the asymmetric cost behavior considers that managerial decisions affect the behavior of companies' costs (Anderson et al., 2003; Banker & Byzalov, 2014; Banker et al., 2018; Ibrahim et al., 2022). In this context, when sales decrease, managers need to make the decision to maintain or reduce unused resources in organizations (Anderson et al., 2003; Chen et al., 2012; Richartz & Borgert, 2021).

According to Ma et al. (2021), the sticky cost phenomenon occurs when managers withhold unused resources in the face of drops in demand, due to economic concerns, behavioral and agency factors. In addition, managers may hold idle resources due to confidence in future demand growth (Chen et al. 2013) or incentive to empire building (Chen et al., 2012).

Bertrand and Schoar (2003) argue that different characteristics of managers result in different decision-making. In this sense, knowledge related to academic training and professional experience provides managers with expertise that can be useful in corporate decision-making (Curi & Lozano-Vivas, 2020; Bortoli & Soares, 2021). Financial expertise refers to the academic knowledge and professional experience of the CEO (*Chief Executive Officer*) that is related to finance (Bortoli & Soares, 2021).

Financially savvy individuals tend to avoid uncertainty and risk (Helliar et al., 2002), as financial and accounting literacy provides greater knowledge in prudent and accurate financial reporting and attunes professionals to the risks of the financing choices a company may make. Hoitash et al. (2016) highlight that managers with financial knowledge are associated with conservative corporate decisions, such as investing less in risky long-term projects and external financing.

On the other hand, other studies show that CEOs with financial expertise follow more aggressive investment strategies (Bertrand & Schoar, 2003), are more apt to choose the best investment projects (García-Sánchez & García-Meca, 2020), act more actively in selecting the best financial policies (Custódio & Metzger, 2014) and have more capacity to obtain credit (Custódio & Metzger, 2014). 2014; Li et al., 2023). In addition, this CEO profile has a greater ability to reduce expenses (Jelic et al., 2019) and to take advantage of opportunities that increase the company's value (Lewis et al., 2014). In this context, CEOs with financial expertise are expected to have an effect on the asymmetric behavior of costs in organizations.

Based on the research of Anderson et al. (2003), studies emerged that analyzed the effect of certain characteristics of managers on the asymmetric cost behavior, such as the opportunistic behavior of the manager (Chen et al., 2012; Kama & Weiss, 2013) and managerial ability (Choi et al., 2018; Restuti et al., 2022). However, CEO financial expertise remains a characteristic of managers not analyzed in the literature on asymmetric cost behavior. Thus, the present study aims to analyze the effect of CEO financial expertise on the asymmetric cost behavior of Brazilian listed firms. To this end, documentary research was carried out, covering the period from 2012 to 2021, which presented evidence that CEO financial expertise has an effect on the asymmetric cost behavior in the anti-sticky direction.

This research adds to the literature the CEO financial expertise as a factor that can cause asymmetric cost behavior. It is important to investigate the personal characteristics of CEOs, since these professionals act as decision-makers in relation to corporate strategies (Malmendier et al., 2011; Custódio & Metzger, 2014), and their decisions have an impact on the behavior of companies' costs (Anderson et al., 2003; Richartz & Borgert, 2021). This research is relevant to researchers studying the influence of leaders' characteristics on corporate decisions, suggesting that the CEO profile can directly affect strategic cost decisions, especially in times of revenue variation.

In a practical way, the study is useful for auditors, market analysts, and boards of directors, as it demonstrates that CEOs with greater financial expertise tend to adopt more aggressive cost-cutting policies in periods of declining revenue. This allows auditors and analysts to adjust their risk assessments and

financial forecasts based on the CEO profile, enhancing their economic feasibility analyses. In addition, the study can help boards rethink their governance strategies, promoting greater diversification in the skills of high-level executives.

2. THEORETICAL FRAMEWORK AND RESEARCH HYPOTHESIS

2.1 Asymmetric cost behavior

The traditional cost model assumes that costs are divided into fixed or variable in relation to changes in the volume of activity, that is, this model adopts a linear relationship between changes in variable costs and changes in activity (Anderson et al., 2003; Weiss, 2010; Banker & Byzalov, 2014; Ibrahim, 2015; Richartz & Borgert, 2021). Thus, when there is a change in the volume of activity by a certain percentage, the costs will change in the same proportion (Anderson et al., 2003; Ballas et al., 2020; Richartz & Borgert, 2021; Ibrahim et al., 2022).

The study by Anderson et al. (2003) was the first to present robust statistical evidence of the asymmetric behavior of costs. Based on a sample of 7,629 companies from 1979 to 1998, Anderson et al. (2003) examined the asymmetric behavior of selling, general and administrative expense accounts. The results showed that costs increase by 0.55% in response to a 1% increase in sales, but that it decreases by only 0.35% in relation to a decrease of the same proportion in sales (Anderson et al., 2003). This asymmetric behavior, in which costs increase more for increases in sales than they decrease in relation to decreases in sales, was called sticky costs by the authors.

Balakrishnan et al. (2004) identified the cost behavior in an inverse way to the sticky, later called anti-sticky by Weiss (2010). Anti-sticky behavior occurs when costs decrease in a greater proportion in response to reductions in the volume of activity than they do in relation to an increase in the level of activity (Balakrishnan et al., 2004; Weiss, 2010; Banker et al., 2018; Richartz & Borgert, 2021).

According to Balakrishnan et al. (2004), the asymmetric anti-sticky behavior may be related to the company operating with idle capacity, thus, in the face of a reduction in sales, it becomes possible to make a greater cut in the company's costs. Porporato and Werbin (2012) present as a justification for the occurrence of anti-sticky behavior the fact that a company has a significant portion of variable costs. Thus, the literature on asymmetric cost behavior encompasses two possibilities of asymmetry: sticky and anti-sticky (Ibrahim et al., 2022).

Previous studies have shown that agency problems can lead to cost asymmetry, as managers can maintain idle capacities due to empire-building incentives (Chen et al. 2012; Brüggen & Zehnder, 2014; Kim et al. 2022). To increase status, power, compensation, and prestige, managers tend to increase the size of the company, resulting in unused resources beyond their optimal level. In this sense, the cost asymmetry driven by managerial opportunism is detrimental to the interests of shareholders (Ma et al., 2021). Thus, tools to minimize opportunism have been evaluated, such as corporate governance (Chen et al. 2012), institutional ownership (Chung et al. 2019) and independent directors (Perry & Shivdasani, 2005).

The cost asymmetry approach, as opposed to the traditional view of cost accounting, considers that managerial decisions affect the behavior of companies' costs (Anderson et al., 2003; Banker & Byzalov, 2014; Banker et al., 2018; Ibrahim et al., 2022). Thus, when sales decrease, managers need to make the decision between keeping unused resources or reducing them to their optimal levels (Anderson et al., 2003; Chen et al., 2012; Richartz & Borgert, 2021). In this sense, the knowledge coming from other institutional ties, professional experiences, and academic training make managers have expertise that can be essential in corporate decision-making (Curi & Lozano-Vivas, 2020; Bortoli & Soares, 2021).

2.2 CEO financial expertise

The personal characteristics of the CEO are strongly related to financing decisions, investments, and corporate performance (Malmendier & Tate, 2005; Custódio & Metzger, 2014; García-Sánchez & García-Meca, 2020; Li et al., 2023). The CEO is responsible for making the indispensable decisions of organizations (Silva & Soares, 2024). The Theory of Upper Echelons presents that the strategic decisions of companies and organizational performance are reflections of the values of the top executives of organizations (Hambrick & Mason, 1984).

Investment decisions are part of the most important corporate decisions, as the efficient allocation of resources impacts the growth and productive capacity of companies (García-Sánchez & García-Meca, 2020). In this sense, knowledge related to financial management, whether it comes from academic training or professional experience, is fundamental to decision-making for professionals who hold the position of CEO (Curi & Lozano-Vivas, 2020).

The knowledge related to the financial area, acquired throughout the academic and professional career, includes CEO financial expertise (Bortoli & Soares, 2021). Among the factors of financial expertise that interfere in the decisions of executives who occupy the position of CEO are those related to: (i) academic background (Bertrand & Schoar, 2003; Malmendier & Tate, 2005; Custódio et al., 2013; Custódio & Metzger, 2014; Lewis et al., 2014; Saxena & Bendale, 2014; Torres & Augusto, 2017; Gupta et al., 2018; Oradi et al., 2019; Gupta et al., 2021); (ii) experience in the financial sector (Malmendier & Tate, 2005; Custódio & Metzger, 2014; Bassyouny et al., 2020; García-Sánchez & García-Meca, 2020; Li et al., 2023); (iii) experience as a financial director (Malmendier & Tate, 2005; Gounopoulos & Pham, 2018; Bassyouny et al., 2020; Li et al., 2023); and (iv) the length of experience as CEO (Custódio et al., 2013; Custódio & Metzger, 2014; Gupta et al., 2018).

Regarding training in the area of finance, Torres and Augusto (2017) argue that it contributes to the development of expertise necessary for the performance of the position of CEO. Along these lines, Bertrand and Schoar (2003) identified that managers with an MBA (Master of Business Administration) follow more aggressive investment strategies. According to Lewis et al. (2014), executives with MBAs are more skilled in strategic decision-making, thus having a greater ability to recognize and take advantage of opportunities that increase the company's value.

Therefore, the educational background of the CEO has a significant effect on the results of organizations (Finkelstein et al., 2009).

Professional experience in the field of finance can come from companies in the financial sector or from a financial position, such as CFO (*Chief Financial Officer*), treasurer, *controller*, accountant or other position that is related to finance (Malmendier & Tate, 2005; Li et al., 2023). According to Custódio and Metzger (2014), financial professional experience favors CEOs in selecting the company's best financial policies more actively, directly interfering in the results of organizations.

In addition, CEOs with experience, whether in the financial sector or in a financial position, have easier access to credit markets, even when conditions are restricted, due to the relationships they have with financial institutions (Custódio & Metzger, 2014; Li et al., 2023). CEOs with previous experience in finance are also more skilled in devising strategies for cutting costs in order to improve the profitability of companies (Jelic et al., 2019).

2.3 Research hypothesis

Previous research has shown that cost asymmetry can derive from managers' characteristics. Banker et al. (2014) documented that the previous increase in sales brings managerial optimism, which makes managers believe that the current decline in sales is temporary, resulting in fewer resource cuts and more cost asymmetry. In this sense, managers who have an optimistic bias when predicting future demand growth are associated with more asymmetric costs.

Jeanjean and Stolowy (2009) show that companies tend to appoint directors with financial expertise on boards of directors. Financial experts are associated with policies that can create value for their financial institutions (Güner et al. 2008). In this sense, Jeanjean and Stolowy (2009) highlight that financial expertise can be a monitoring mechanism to reduce agency costs.

The degree of financial specialization is a key element of the human capital of independent directors that can affect their ability to monitor and advise the executive team (Güner et al., 2008; Kor & Sundaramurthy, 2009). Gilani et al. (2021) highlight that directors who are experts in finance are seen as more likely to identify risks than other directors without this specialization.

Financially savvy CEOs, when faced with uncertainty, exhibit more conservative attitudes (Liu et al., 2023), generating less optimistic expectations. Therefore, CEOs with greater financial knowledge may be less confident and predict future demand more conservatively. Regarding cost behavior, conservative managers tend to predict lower future demand and accelerate cost cutting when sales fall (Richartz & Borgert, 2021). When sales increase, managers predict that future demand will be limited and slow down increases in costs (Anderson et al., 2003). Thus, risk aversion and the conservatism of financial expertise can lead CEOs to cut more resources when sales decrease, as well as invest less when sales increase, increasing cost asymmetry.

Financial expertise enables CEOs to allocate company resources more assertively (García-Sánchez & García-Meca, 2020), due to having a better

understanding of financial practices (Custódio & Metzger, 2014), as well as easier access to financing (Custódio & Metzger, 2014; Li et al., 2023). In this way, companies managed by CEOs with financial expertise can become more involved in resource-intensive organizational activities (such as R&D projects, advertising campaigns, human resource development programs) with the aim of increasing long-term operational performance.

CEOs with financial expertise, when faced with a temporary drop in sales, can first consider the long-term economic consequences, before promoting a reduction in the company's resources, such as cuts in the number of employees and corporate assets (Gilani et al., 2021). In this way, the CEO with financial expertise can cautiously reduce the level of costs so as not to harm the company's future competitive advantage. Thus, the decision to maintain idle resources in periods of sales declines, on the understanding that this drop is temporary, results in the asymmetric behavior of costs for companies (Anderson et al., 2003; Chen et al., 2012; Richartz & Borgert, 2021; Ibrahim et al., 2022).

Financial expertise also provides the CEO with greater ability to devise strategies for spending cuts (Jelic et al., 2019) and greater ability to take advantage of opportunities that increase the company's value (Lewis et al., 2014). In this context, CEOs with financial expertise may adopt more aggressive strategies to cut company expenses, which also leads to asymmetric cost behavior (Weiss, 2010; Banker et al., 2014; Richartz & Borgert, 2021). In view of the above, it is assumed that CEO financial expertise has an effect on the asymmetric behavior of companies' costs. Therefore, the following research hypothesis was formulated:

H1: CEO financial expertise has an effect on asymmetric cost behavior.

3 METHODOLOGICAL PROCEDURES

3.1 Population and sample

The population consists of Brazilian companies listed on B3 (Brasil, Bolsa, Balcão) to all sectors of operation, with the exception of the financial sector. The exclusion of financial companies is justified by the fact that they have an operational structure dedicated mainly to the provision of financial services, which makes it difficult to compare results with non-financial companies (Richartz & Borgert, 2021; Ibrahim et al., 2022). The analysis period involves the years 2012 to 2021, with a longitudinal design in a balanced way.

Table 1 shows the composition of the companies in the sample in Panel A. Panel B shows the composition of the companies in the sample by sector, according to the GICS classification of the *Refinitiv* database. As shown in Panel A of Table 1, a total of 480 companies listed on B3 were available in the *Refinitiv database*.

Regarding the exclusion of *outliers,* the cutoff point was considered to be variations above 100% in NSR in relation to the previous year, both for increases and decreases in NSR, as adopted by Balakrishnan et al. (2014) and Pamplona et al. (2018). It is considered that companies that presented a variation above 100% in the NSR had some eventual change, such as a merger or incorporation, which affects the cost structure and its analysis in that period (Pamplona et al., 2018).

Table 1
Companies in the study sample

Panel A - Composition of the sample companies	**AB**	**RF**
(+) Companies listed on B3	480	100,0%
(-) Companies in the financial sector	79	16,5%
(=) Subtotal	401	83,5%
(-) Companies with at least one year without data	167	34,8%
(-) Companies with at least one year without data for:	24	5,0%
(-) NSR	15	3,1%
(-) COGS	7	1,5%
(-) SG&A	2	0,4%
(-) Companies with at least one year with negative values for:	4	0,8%
(-) NSR	2	0,4%
(-) SG&A	2	0,4%
(-) Companies with at least one year with variation above 100% in NSR	28	5,8%
(=) Total	178	37,1%
Panel B - Composition of companies by sector	**AB**	**RF**
Health care	5	2,8%
Real estate	17	9,6%
Cyclical consumption	39	21,9%
Non-cyclical consumption	20	11,2%
Energy	4	2,2%
Industry	29	16,3%
Basic materials	24	13,5%
Educational and academic services	3	1,7%
Utilities	31	17,4%
Technology	6	3,4%
(=) Total	178	100,0%

Caption: AF: Absolute Frequency; RF: Relative Frequency; B3: Brasil, Bolsa, Balcão; NSR: Net Sales Revenue; COGS: Cost of Goods Sold; SG&A: Selling, General and Administrative Expenses.
Source: Prepared by the authors.

3.2 Research constructs

3.2.1 CEO financial expertise

To measure CEO financial expertise, an adaptation of the model by Bortoli and Soares (2021) was used. Table 2 identifies the variables that make up the construct of CEO financial expertise.

The information regarding the academic and professional background of the CEO, necessary for the measurement of the variables of financial expertise, was obtained from the reference forms of listed companies through item 12.5/6 – Composition and professional experience of management and fiscal council.

Although companies must inform in this item the academic and professional background of each member of the company's bodies (executive board, board of directors and fiscal council), in some cases this information was not properly filled in the reference forms. In these cases, it was verified if the CEO had a profile on Linkedin with data on academic and professional background. Otherwise, 0 (zero) was considered for the three dichotomous variables (BF, EFS and EFD).

Table 2
Variables of CEO financial expertise construct

Dimension	Variable	Measurement of the item	References
Academic	BF	Dichotomous variable, where 1 is considered if the CEO has academic background (undergraduate and/or graduate) related to finance (courses in Administration, Accounting, Economics and Finance), and 0 (zero), otherwise.	Bortoli and Soares (2021) Silva et al. (2023) Silva and Soares (2024)
Professional	EFS	Dichotomous variable, where 1 is considered if the CEO has professional experience in companies in the financial sector, and 0 (zero), otherwise.	Bortoli and Soares (2021) Silva et al. (2023) Silva and Soares (2024)
	EFD	Dichotomous variable, where 1 is considered if the CEO has professional experience as a financial director, and 0 (zero), otherwise.	
	EC	Continuous variable, which refers to the number of years the CEO has experience in this position.	

Caption: CEO: Chief Executive Officer; BF: academic background of the CEO in the area of finance; EFS: experience of the CEO in the financial sector; EFD: experience of the CEO as a financial director; EC: years of experience in the position of CEO.
Source: Adapted from Bortoli and Soares (2021).

To obtain an index of CEO financial expertise, which covers all four variables specified in Table 2, Principal Component Analysis (PCA) was used. For the operationalization of the PCA, initially, data were collected from the four variables of the construct of CEO financial expertise through the reference forms of listed companies and organized in an electronic spreadsheet. Subsequently, the Stata® software was used for data import and PCA, as well as for PCA validation tests (KMO Statistics and Bartlett Sphericity Test).

The KMO statistics vary between 0 and 1, and the values of this test that indicate whether the factor analysis is appropriate vary among authors. According to Hair et al. (2009), KMO values below 0.50 are considered unacceptable, between 0.50 and 0.69 as acceptable and above 0.70 are considered desirable. The *Bartlett* Sphericity Test tests the hypothesis that the variables are not correlated in a correlation matrix, and the null hypothesis indicates that the factorial model is inappropriate (Hair et al., 2009).

3.2.2 Asymmetric cost behavior

Asymmetric cost behavior was analyzed for the Cost of Goods Sold (COGS), Selling, General and Administrative Expenses (SG&A) and Total Cost (TC) accounts, which refer to the three variables dependent on this study. It should be noted that TC refers to the sum of COGS and SG&A. The values of COGS, SG&A and NSR accounts were obtained from the Refinitiv database.

COGS and SG&A are frequently used in the literature on asymmetric cost behavior as dependent variables, as they are more likely to be affected by

managers' decisions (Ibrahim et al., 2022). Financial expenses were not considered, as they are not directly related to the volume of production, which can make it difficult to analyze the results (Richartz & Borgert, 2021).

Equation 1 refers to the panel data regression model for the identification of asymmetric cost behavior, as proposed by Anderson et al. (2003).

Equation 1

$$log\left\{\frac{Costs_{i,t}}{Costs_{i,t-1}}\right\} = \beta_0 + \beta_1\, log\left\{\frac{NSR_{i,t}}{NSR_{i,t-1}}\right\} + \beta_2 dNSR * log\left\{\frac{NSR_{i,t}}{NSR_{i,t-1}}\right\} + \varepsilon_{i,t}$$

Where:
Costs = equivalent to the different dependent variables on the study (COGS, SG&A and TC);
COGS = Cost of goods sold;
SG&A = Selling, general and administrative expenses;
TC = Total cost;
NSR = Net sales revenue;
dNSR = Dichotomous variable of NSR decrease;
ε = Regression error.

It should be noted that this same equation applies to COGS, SG&A and TC, but not simultaneously. The model by Anderson et al. (2003) captures the proportional change in COGS, SG&A or TC for every 1% proportional change in NSR. NSR is used as an approximation of the production volume of the companies. The dichotomous variable assumes the value of 1 when the NSR of company *i* in period *t* is less than the NSR of period *t-1* and, 0 (zero), otherwise.

In order to identify cost asymmetry, both β1 and β2 coefficients must present statistically significant results. If the results identify that there is asymmetry in costs, it is highlighted that the asymmetric behavior can be both sticky cost and anti-sticky cost.

When costs show an increase in relation to the 1% growth in NSR greater than a reduction in costs in relation to the 1% decrease in NSR, the asymmetric sticky cost behavior is presented. This behavior is identified when the coefficient *β1* is greater than the sum of the coefficients *β1* and *β2* (*β1 > β1 + β2*). In this case, costs increase faster when sales grow than they do when sales decline.

On the other hand, when the reduction in costs in relation to the 1% drop in NSR is greater than the increase in costs in relation to the 1% growth in NSR, the asymmetric anti-sticky *cost* behavior is demonstrated. This behavior is identified when the sum of β1 and *β2* coefficients is greater than the β1 coefficient (*β1 + β2 > β1*). In this situation, the decrease in costs is greater in the face of sales declines than their increase in sales growth.

3.3 Data analysis procedures

Initially, preliminary procedures were performed using Stata® software. These procedures comprised the following stages: (i) Descriptive statistics and

correlation matrix of the four variables of CEO financial expertise; (ii) ACP for grouping the four variables of CEO financial expertise into a single index; (iii) Tests for PCA validation (KMO Statistics and Bartlett Sphericity Test); (iv) Descriptive statistics and correlation matrix of the variables used in the regressions.

After the preliminary procedures were carried out, the regressions of the relationship of Hypothesis 1, according to Equation 2, were operationalized using Stata® software, through the *Ordinary Least Squares* (OLS) model. It is noteworthy that the regressions were operationalized separately for COGS, SG&A and TC.

The model by Anderson et al. (2003) makes it possible to include other variables to examine the effect on the asymmetric cost behavior of as interaction terms (Ibrahim et al., 2022). As demonstrated in Equation 1, the original model contains two essential variables (*β1* and *β2*), and new variables can be included, multiplying them by the dichotomous variable of NSR decrease and by the logarithm of the NSR ratio (*t/t-1*).

It is noteworthy that, in order to meet the objective of this study, the independent variable of CEO financial expertise was inserted in the model of Anderson et al. (2003). It should be noted that, in this case, asymmetric sticky cost behavior is identified when the *β1* coefficient is greater than the sum of the *β1* and *β3* coefficients. On the other hand, asymmetric anti-sticky cost behavior is demonstrated when the sum of the coefficients *β1* and *β3* is greater than the coefficient *β1*.

Equation 2

$$log\left\{\frac{Costs_{i,t}}{Costs_{i,t-1}}\right\} = \beta_0 + \beta_1\, log\left\{\frac{NSR_{i,t}}{NSR_{i,t-1}}\right\} + \beta_2 dNSR * log\left\{\frac{NSR_{i,t}}{NSR_{i,t-1}}\right\} + \boldsymbol{\beta_3 dNSR} * \boldsymbol{log}\left\{\frac{\boldsymbol{NSR_{i,t}}}{\boldsymbol{NSR_{i,t-1}}}\right\} * \boldsymbol{FE_{i,t}} + \varepsilon_{i,t}$$

Where:
Costs = equivalent to the different dependent variables on the study (COGS, SG&A and TC);
COGS = Cost of goods sold;
SG&A = Selling, general and administrative expenses;
TC = Total cost;
NSR = Net sales revenue;
dNSR = Dichotomous variable of NSR decrease;
FE = CEO financial expertise;
ε = Regression error.

After the operationalization of the regression models, normality, multicollinearity and autocorrelation tests of the residuals were performed, with the objective of validating the results of the models. The *Shapiro-Wilk* normality test demonstrated that the sample data are not normal. If the residuals do not have a

normal distribution, but the sample size is large enough, it can be assumed that the coefficients have an asymptotically normal distribution, based on the Central Limit Theorem (Baltagi, 2015). Thus, despite the non-normality of the data, this assumption of OLS linear regression was relaxed when considering the Central Limit Theorem, due to the number of observations in this research.

For the analysis of the multicollinearity problem, the Variance Inflation Factor (VIF) test was performed. The VIF test verifies whether the independent variables have exact or approximately exact linear relationships (Fávero et al., 2014; Fávero & Belfiore, 2017). VIF values greater than 10 indicate that the independent variables are highly collinear (Hair et al., 2009; Gujarati, 2011). To analyze the existence of the autocorrelation problem of the residuals, the Durbin-Watson test was performed.

4 ANALYSIS AND DISCUSSION OF THE RESULTS

4.1 Descriptive analysis and correlation matrix

Table 3 shows the descriptive statistics of the four variables related to the CEO financial expertise construct: BF, EFS, EFD and EC.

Table 3
Descriptive statistics of CEO financial expertise variables

Panel A: Continuous variables					
Variables	**Mean**	**Standard Deviation**	**Percentile 25%**	**Median**	**Percentile 75%**
EC	9.0708	9.9687	2.5	6	12
Observations: 1,780					

Panel B: Dichotomous variables			
Variables	**Category**	**Observations**	**Frequency (%)**
BF	1	1,218	68.43%
	0	562	31.57%
Total		**1,780**	**100.00%**
EFS	1	273	15.34%
	0	1,507	84.66%
Total		**1,780**	**100.00%**
EFD	1	344	19.33%
	0	1,436	80.67%
Total		**1,780**	**100.00%**

Caption: EC: years of experience in the position of CEO; BF: academic background of the CEO in the area of finance; EFS: experience of the CEO in the financial sector; EFD: experience of the CEO as a financial director.
Source: Elaborated by the authors.

Table 4 shows the descriptive statistics of the variables of the relationships investigated in this study. The following measures are presented: mean, standard deviation, median, and 25% and 75% percentiles.

The research sample included 1,780 observations for the period from 2012 to 2021. In Panel A of Table 4, the dependent variables of the study are presented: logCOGS, logSG&A and logTC. In Table 4, the independent variables of this research are shown: logNSR and FE. It should be noted that in the sample there

was no differentiation in size, size, sector or any other characteristics that could differentiate one company from another. Thus, the sample is heterogeneous, which thus justifies the standard deviation higher than the mean presented in the variables of this study.

Table 4
Descriptive statistics of the variables of the relationships investigated in the study

Panel A: Dependent variables					
Variables	**Mean**	**Standard Deviation**	**Percentile 25%**	**Median**	**Percentile 75%**
logCOGS	0.0263	0.1271	-0.0094	0.0314	0.0737
logSG&A	0.0212	0.1163	-0.0172	0.0261	0.0673
logTC	0.0261	0.1060	-0.0074	0.0307	0.0696
Observations: 1,780					
Panel B: Independent variables					
Variables	**Mean**	**Standard Deviation**	**Percentile 25%**	**Median**	**Percentile 75%**
logNSR	0.0249	0.1136	-0.0082	0.0338	0.0721
FE	0.00	1.2001	-0.9453	0.0118	0.3606
Observations: 1,780					
Panel C: Profit and Loss Accounts					
Accounts	**Movement (R$ million)**	**Mean (R$ million)**	**% TC**	**% NSR**	
COGS	11,636,104.49	6,537.14	86.53%	70.30%	
SG&A	1,811,776.64	1,017.85	13.47%	10.95%	
TC	13,447,881.13	7,554.99	100.00%	81.25%	
NSR	16,551,637.65	9,298.67	-	100.00%	
Observations: 1,780					

Caption: logCOGS, logSG&A, logTC and logNSR: log of the ratio (*t/t-1*) of the Cost of Goods Sold (COGS), Selling, General and Administrative Expenses (SG&A), Total Cost (TC) and Net Sales Revenue (NSR), respectively; FE: CEO financial expertise measured by PCA.
Source: Elaborated by the authors.

Panel C of Table 4 presents the movement and mean, in millions of Reais, of the accounts used to calculate the asymmetric cost behavior for the period of analysis. In addition, the percentage of COGS and SG&A in relation to TC is demonstrated, as well as how much COGS, SG&A and TC represent proportionally in relation to NSR. It is verified that COGS represents most of the TC (86.53%), while SG&A refers to 13.47%.

Table 5 presents Pearson's (lower axis) and Spearman's (upper axis) correlation matrix between the four variables used to measure CEO financial expertise.

Table 5
Correlation matrix of CEO financial expertise variables

Variables	**BF**	**EFS**	**EFD**	**EC**
BF	1	0.1818***	0.1335***	-0.0516**
EFS	0.1818***	1	0.2181***	-0.0539**
EFD	0.1335***	0.2181***	1	-0.0388
EC	-0.1787***	-0.0575**	-0.0978***	1

Note: ***significance at the level of 1%; **5%.
Caption: BF: academic background of the CEO in the area of finance; EFS: experience of the CEO in the financial sector; EFD: experience of the CEO as a financial director; EC: years of experience in the position of CEO.
Source: Elaborated by the authors.

In order to use PCA, it is necessary to have a correlation between the construct variables (Lattin et al., 2011). Table 5 shows that all Pearson's correlations of CEO financial expertise variables showed significance at the level of 1%, except for the correlation between the variables EC and EFS, which showed significance at the level of 5%. Regarding Spearman's correlation, only the correlation between the variables EFD and EC did not demonstrate significance. Thus, it was possible to carry out the PCA for the creation of the CEO financial expertise variable (FE).

Table 6 presents the Pearson (lower axis) and Spearman (upper axis) correlation matrix for the variables of the relationships investigated in this study.

Table 6
Correlation matrix of the variables of the relationships investigated in the study

Variables	logNSR	logCOGS	logSG&A	logTC	FE
logNSR	1	0.8366***	0.4975***	0.8554***	0.0320
logCOGS	0.7925***	1	0.4210***	0.9420***	0.0211
logSG&A	0.4432***	0.3547***	1	0.5979***	0.0189
logTC	0.8313***	0.9487***	0.5165***	1	0.0201
FE	0.3962	0.0084	0.0179	0.0163	1

Note: ***significance at the level of 1%; **5%.
Caption: logCOGS, logSG&A, logTC and logNSR: log of the ratio (*t/t-1*) of the Cost of Goods Sold (COGS), Selling, General and Administrative Expenses (SG&A), Total Cost (TC) and Net Sales Revenue (NSR), respectively; FE: CEO financial expertise measured by PCA.
Source: Elaborated by the authors.

Table 6 shows that all correlations between the variables logNSR, logCOGS, logSG&A and logTC were significant at the level of 1%. The highest correlation occurred between the logTC and logCOGS variables, followed by the correlation between the logTC and logNSR variables. FE variable showed a significant relationship with the dependent variables logCOGS, logSG&A and logTC, which indicates that CEO financial expertise has an effect on the asymmetric cost behavior in Brazilian listed companies. It is also verified that the independent variables logNSR and FE did not exhibit a significant correlation, which suggests that in this case there are no problems of multicollinearity, thus making it possible to perform regressions.

Table 7 shows the result of the Principal Component Analysis, with the variance explained for each component formed, allowing the identification of the number of factors to be extracted by means of the eigenvalue or by cumulative variance.

KMO statistic presented a value of 0.5837. According to Hair et al. (2009), this result can be considered as acceptable for the realization of the PCA of CEO financial expertise. Silva and Soares (2024) also used the financial expertise model of Bortoli and Soares (2021) and identified a KMO of 0.5970, which is similar to the one presented in this study. Bartlett Sphericity Test showed significance for the rejection of the null hypothesis, which indicates a strong relationship between the items. Thus, these results indicate that factor analysis is adequate for CEO financial expertise.

Table 7
Analysis of the key components of CEO financial expertise

Bartlett sphericity test			
Chi-square	231,510	*p-value*	0,000
Kaiser-Meyer-Olkin (KMO)	0,5837		

Factor analysis for principal component factor – Number of extracted components (*eigenvalues*)

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	**1.4402**	0.4597	0.3601	0.3601
Factor 2	0.9805	0.1476	0.2451	0.6052
Factor 3	0.8330	0.0867	0.2082	0.8134
Factor 4	0.7462	-	0.1866	1.0000

Source: Elaborated by the authors.

With the adoption of the criterion of *Eigenvalues* greater than 1, a component was formed (in bold in Table 7). Thus, a variable was generated, in which the percentage of variation shared for all variables to create a factor equal to 0.3601. In this way, this variable shares all the characteristics of CEO financial expertise, which are academic background in the area of finance, experience in the financial sector, experience as a financial director and years of experience as a CEO (Bortoli & Soares, 2021).

4.2 Results of the effect of CEO financial expertise on the asymmetric cost behavior

In this subsection, the results of the regressions are presented in order to meet the objective of the research, which deals with the effect of CEO financial expertise on the asymmetric cost behavior. The results are shown in Table 8 for the dependent variables logCOGS, logSG&A and logTC.

Table 8
Effect of CEO financial expertise on the asymmetric cost behavior

Variables	Dependent = logCOGS		Dependent = logSG&A		Dependent = logTC	
	Coefficient	T test	Coefficient	T test	Coefficient	T test
Constant	0.0050*	1.94	0.0073**	2.07	0.0037*	1.87
logNSR	0.8742***	27.31	0.4946***	11.45	0.8232***	33.80
d-logNSR	0.0178	0.41	-0.0652	-1.10	-0.0764**	-2.29
d-FE	0.0693***	3.71	0.0145	0.58	0.0318**	2.24
Model sig.	0.0000		0.0000		0.0000	
R^2	0.6310		0.1971		0.6928	
DW	2.4606		2.3761		2.4452	
VIF	1.00 to 3.94		1.00 to 3.94		1.00 to 3.94	
Observations	1,780		1,780		1,780	

Note: ***significance at the level of 1%; **5%; *10%.
Caption: logCOGS, logSG&A, logTC and logNSR: log of the ratio (*t/t-1*) of the Cost of Goods Sold (COGS), Selling, General and Administrative Expenses (SG&A), Total Cost (TC) and Net Sales Revenue (NSR), respectively; d-logNSR: dichotomous variable of NSR decrease multiplied by the log of the NSR ratio (*t/t-1*); d-FE: variable of CEO financial expertise (FE) multiplied by the dichotomous variable of NSR decrease and by the log of the NSR ratio (*t/t-1*); Sig.: Model significance; DW: Durbin-Watson; VIF: Variance Inflation Factor.
Source: Elaborated by the authors.

The results presented in Table 8 indicate that the three regression models were significant, with explanation coefficients (R^2) of 63.10% for logCOGS, 19.71% for logSG&A and 69.28% for logTC, which suggests that the model explains well the variation observed in the costs analyzed. The values of the Durbin-Watson test, between 2.3761 and 2.4606, indicate the absence of autocorrelation of the residuals. The VIF test showed values from 1.00 to 3.94, which demonstrates that there were no multicollinearity problems.

For the regressions in Table 8, the asymmetry is determined based on the coefficient of the d-FE variable, which refers to the PCA result of CEO financial expertise multiplied by the dichotomous variable of NSR decrease and by the log of the NSR ratio (*t/t-1*). Thus, when the coefficient of the logNSR variable is greater than the sum of the coefficients of the logRLV and d-FE variables, sticky asymmetric behavior is identified. However, if the sum of the coefficients of the logNSR and d-FE variables is greater than the coefficient of the logNSR variable, anti-sticky asymmetric behavior is presented.

Regarding the effect of CEO financial expertise, the d-FE variable showed significance at the level of 1% for COGS, indicating asymmetric anti-sticky behavior. This indicates that when the NSR increases by 1%, COGS increases by 0.8742%, however, when the NSR decreases by 1%, COGS decreases by 0.9435% (0.8742% + 0.0693%). For TC, the d-FE variable was also significant and with asymmetric anti-sticky behavior. Thus, when the NSR increases by 1%, TC increases by 0.8232%, and when the NSR decreases by 1%, TC decreases by 0.8550% (0.8232% + 0.0318%). On the other hand, the d-FE variable did not present significance for the asymmetric behavior of SG&A. Thus, it was not possible to affirm that CEO financial expertise has an effect on asymmetric behavior of SG&A.

4.3 Discussion of the results

Table 9 presents a summary of the results regarding the effect of CEO financial expertise on the asymmetric behavior of the three dependent variables analyzed in this research (COGS, SG&A and TC).

Table 9
Summary of the effect of CEO financial expertise on the asymmetric cost behavior

Dependent variables	1% variation in NSR			Asymmetric Behavior	Hypothesis 1 Conclusion
	Increase	Reduction			
	logNSR (i)	d-FE (ii)	Total (i + ii)		
logCOGS	0.8742%***	0.0693%***	0.9435%***	*Anti-sticky*	Accepted
logSG&A	0.4946%***	0.0145%	0.5091%	Not significant	Rejected
logTC	0.8232%***	0.0318%**	0.8550%**	*Anti-sticky*	Accepted

Note: ***significance at the level of 1%; **5%; *10%.
Caption: logCOGS, logSG&A, logTC and logNSR: log of the ratio (*t/t-1*) of the Cost of Goods Sold (COGS), Selling, General and Administrative Expenses (SG&A), Total Cost (TC) and Net Sales Revenue (NSR), respectively; d-FE: variable of CEO financial expertise (FE) multiplied by the dichotomous variable of NSR decrease and by the log of the NSR ratio (*t/t-1*).
Source: Elaborated by the authors.

The results presented suggest that CEO financial expertise causes the asymmetric behavior of COGS and TC, and the anti-sticky behavior was identified in both situations. Thus, the higher the level of CEO financial expertise, the greater the reduction in COGS and TC in the face of reductions in NSR. Based on these results, Hypothesis 1 of this research is accepted. Thus, this demonstrates that CEOs with financial expertise, in the face of periods of declines in NSR, did not adopt a conservative strategy for maintaining unused resources.

Analyzing the results of this research under the absence of conflict of interest between shareholders and managers, it is understood that CEOs with financial expertise have a more aggressive strategy of cutting production expenditures in periods of decline in NSR. Consequently, this can lead to asymmetric anti-sticky behavior for COGS.

Likewise, asymmetric anti-sticky behavior was identified for TC, which is justified, since COGS comprises most of TC in the Brazilian listed companies in the sample of this study, as shown in Panel C of Table 4. Thus, CEOs with financial expertise, due to their ability to strategize cost-cutting strategies (Jelic et al., 2019) and ability to seize opportunities that increase the company's value (Lewis et al., 2014), may have made greater cuts in production expenses aimed at improving the organization's profitability.

Anti-sticky behavior for COGS in this study suggests that CEOs with financial expertise have adopted the strategy of working without idle capacity in the production area. According to Balakrishnan et al. (2004), a company that is operating with excess installed capacity is more likely to use this idle capacity to absorb demand in periods of increased sales. Thus, if there is a reduction in sales, due to idle installed capacity, it becomes possible to make a greater cut in the company's costs (Balakrishnan et al., 2004; Weiss, 2010; Richartz & Borgert, 2021).

CEO financial expertise has not been identified as having an effect on asymmetric behavior of SG&A. Thus, it is understood that this CEO profile, due to their academic background and professional experience in finance, has a greater capacity to adjust expenditures with SG&A according to variations in NSR. In addition, expenditures such as training, commissions, travel, and advertising are expenses that are easier to manage than production expenditures. In this way, it becomes easier to reduce expenditures with SG&A in periods of declines in NSR, as well as to acquire these expenditures again when NSR increases.

4.4 Additional tests

Table 10 presents the additional regression tests for the four variables that make up the CEO financial expertise, which are analyzed individually in the asymmetric behavior of COGS, SG&A and TC.

The results show that, for the dependent variable logCOGS, three of the four independent variables were significant: the academic background of the CEO in the area of finance (d-BF), experience of the CEO in the financial sector (d-EFS) and years of experience in the position of CEO (d-EC). Asymmetric behavior identified was anti-sticky in all three cases. In the case of the dependent variable logTC, two independent variables were significant: d-BF and d-EC, and anti-sticky

behavior was also identified. On the other hand, for the dependent variable logSG&A, none of the four independent variables was significant. In general, the results of the regressions of the individual effect of the four variables of CEO financial expertise on the asymmetric cost behavior are aligned with the results of the regressions of CEO financial expertise measured through PCA.

Table 10
Additional tests of regressions of CEO financial expertise variables

Variables	Dependent = logCOGS		Dependent = logSG&A		Dependent = logTC	
	Coefficient	T test	Coefficient	T test	Coefficient	T test
Constant	0.0054**	2.05	0.0075**	2.11	0.0045**	2.25
logNSR	0.8711***	27.13	0.4923***	11.27	0.8164***	33.46
d-logNSR	-0.1450***	-2.86	-0.1197*	-1.73	-0.1828***	-4.74
d-BF	0.1128***	2.41	0.0210	0.33	0.1013***	2.85
d-EFS	0.1474***	3.07	0.0397	0.61	0.0446	1.22
d-EFD	-0.0044	-0.06	0.0221	0.23	-0.0308	-0.58
d-EC	0.0086***	3.58	0.0043	1.33	0.0077***	4.22
Model sig.	0.0000		0.0000		0.0000	
R^2	0.6369		0.1983		0.6985	
DW	2.4779		2.3771		2.4623	
VIF	1.14 to 5.36		1.14 to 5.36		1.14 to 5.36	
Observations	1,780		1,780		1,780	

Note: ***significance at the level of 1%; **5%; *10%.
Caption: logCOGS, logSG&A, logTC and logNSR: log of the ratio (*t/t-1*) of the Cost of Goods Sold (COGS), Selling, General and Administrative Expenses (SG&A), Total Cost (TC) and Net Sales Revenue (NSR), respectively; d-logNSR: dichotomous variable of NSR decrease multiplied by the log of the NSR ratio (*t/t-1*); d-BF, d-EFS, d-EFD and d-EC: variables of the academic background of the CEO in the area of finance (BF), experience of the CEO in the financial sector (EFS), experience of the CEO as a financial director (EFD) and the years of experience in the position of CEO (EC) multiplied by the dichotomous variable of NSR decrease and by the log of the NSR ratio (*t/t-1*), respectively; Sig.: Model significance; DW: Durbin-Watson; VIF: Variance Inflation Factor.
Source: Elaborated by the authors.

Due to the COVID-19 pandemic in 2020 and 2021, additional tests were carried out on the effect of CEO financial expertise on the asymmetric cost behavior. Panel A of Table 11 demonstrates the results for the non-pandemic period (2012 to 2019), while Panel B displays the results for the pandemic period (2020 to 2021).

In general, it is verified that the variables logCOGS and logTC showed anti-sticky behavior in the non-pandemic period. On the other hand, no significance was found for the asymmetric behavior of these variables in the pandemic period. These results suggest that the CEO with financial expertise follows more aggressive strategies to reduce COGS expenditures in the non-pandemic period, consequently having an effect on TC. However, in the pandemic period, CEOs were more cautious in cutting production expenditures, thus not generating asymmetric behavior for COGS and TC. The logSG&A variable did not show significance for asymmetric behavior, both in the non-pandemic period and in the pandemic period, which is in line with the results presented regarding the regressions of CEO financial expertise measured through ACP (Table 8) and individually (Table 10).

Table 11
Additional tests of the pandemic and non-pandemic period

Panel A: Non-pandemic period						
Variables	**Dependent = logCOGS**		**Dependent = logSG&A**		**Dependent = logTC**	
	Coefficient	**T test**	**Coefficient**	**T test**	**Coefficient**	**T test**
Constant	0.0083***	3.84	0.0110***	2.82	0.0070***	4.22
logNSR	0.8787***	28.07	0.4580***	8.06	0.8240***	34.08
d-logNSR	0.1187***	2.78	0.0844	1.09	0.0371	1.12
d-FE	0.0613***	3.65	0.0262	0.86	0.0249*	1.92
Model sig.	0.0000		0.0000		0.0000	
R^2	0.7353		0.195		0.7847	
DW	2.0809		2.3460		2.2270	
VIF	1.00 to 4.20		1.00 to 4.20		1.00 to 4.20	
Observations	1,424		1,424		1,424	
Panel B: Pandemic period						
Variables	**Dependent = logCOGS**		**Dependent = logSG&A**		**Dependent = logTC**	
	Coefficient	**T test**	**Coefficient**	**T test**	**Coefficient**	**T test**
Constant	-0.0053	-0.51	0.0004	0.04	-0.0059	-0.76
logNSR	0.8912***	9.96	0.5375***	7.31	0.8386***	12.72
d-logNSR	-0.1666	-1.38	-0.2825***	-2.84	-0.2727***	-3.06
d-FE	0.0847	1.61	-0.0103	-0.24	0.0453	1.17
Model sig.	0.0000		0.0000		0.0000	
R^2	0.4835		0.2344		0.5554	
DW	2.91539		2.3927		2.835756	
VIF	1.00 to 4.28		1.00 to 4.28		1.00 to 4.28	
Observations	356		356		356	

Note: ***significance at the level of 1%; **5%; *10%.
Caption: logCOGS, logSG&A, logTC and logNSR: log of the ratio (*t/t-1*) of the Cost of Goods Sold (COGS), Selling, General and Administrative Expenses (SG&A), Total Cost (TC) and Net Sales Revenue (NSR), respectively; d-logNSR: dichotomous variable of NSR decrease multiplied by the log of the NSR ratio (*t/t-1*); d-FE: variable of CEO financial expertise (FE) multiplied by the dichotomous variable of NSR decrease and by the log of the NSR ratio (*t/t-1*); Sig.: Model significance; DW: Durbin-Watson; VIF: Variance Inflation Factor.
Source: Elaborated by the authors.

5 FINAL CONSIDERATIONS

This research aimed to analyze the effect of CEO (Chief Executive Officer) financial expertise on the asymmetric cost behavior of Brazilian listed companies. The results showed significance for the asymmetric behavior of COGS (Cost of Goods Sold) and TC (Total Cost), and anti-sticky behavior was identified in both cases. Thus, it is understood that the higher the level of CEO financial expertise, the greater the reduction in COGS and TC in the face of reductions in NSR (Net Sales Revenue).

The results obtained demonstrate that CEOs with financial expertise have a more aggressive strategy of cutting production expenditures in periods of decline in NSR. Thus, this had an impact not only on COGS, but also on TC, since most of the TC is composed of COGS in the companies in the sample of this study. Based on these findings, Hypothesis 1 of this research is accepted. On the other hand, no significance was identified for the asymmetric behavior of SG&A. One explanation

for this may be that this CEO profile has a greater capacity to adjust this type of expenditure according to variations in NSR.

Additional tests of the individual effect of the four variables of CEO financial expertise on the asymmetric cost behavior presented results aligned with those of CEO financial expertise measured through PCA. Thus, the asymmetric anti-sticky behavior was verified for the variables BF, EFD and EC with COGS, as well as for the variables BF and EC with TC. None of the four variables (BF, EFS, EFD and EC) showed asymmetric behavior with SG&A, as occurred in the case of CEO financial expertise measured through PCA.

As a contribution, this study adds to the literature the CEO financial expertise as a determining factor of the asymmetric cost behavior. In addition, based on the findings of this study, the work procedures of auditors, market analysts, and other professionals can be enhanced by a better understanding of how costs may behave according to the CEO's level of financial expertise.

This study has some limitations. Initially, it is emphasized that the results found in this research cannot be generalized to a larger population, since only Brazilian listed companies were analyzed, with data available in the analyzed period, thus configuring a non-probabilistic sample. Another limitation of this research refers to the use of the NSR as an approximation of volume, since in this case the price variation is not considered.

As recommendations for future studies, it is suggested that other studies consider a larger number of companies, including companies from other countries. It is also suggested to analyze the effect of CEO financial expertise on the asymmetric cost behavior in companies under judicial reorganization. Because these companies are in severe financial difficulties, it is assumed that the level of CEO financial expertise is lower in companies in a situation of judicial reorganization.

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